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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/688,810	10/17/2003	Robert L. Gerlach	F130	9690
25784	7590	04/05/2005		
MICHAEL O. SCHEINBERG P.O. BOX 164140 AUSTIN, TX 78716-4140			EXAMINER VANORE, DAVID A	
			ART UNIT 2881	PAPER NUMBER

DATE MAILED: 04/05/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

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<b>Office Action Summary</b>	Application No. 10/688,810	Applicant(s) GERLACH ET AL.	
	Examiner David A. Vanore	Art Unit 2881	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 09 March 2005.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) 1-5 and 15-20 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 6, 10 and 13 is/are rejected.
- 7) ☒ Claim(s) 7-9, 11-12, and 14 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 17 October 2003 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## **DETAILED ACTION**

### ***Election/Restrictions***

Applicant's election of claims 6-14 in the reply filed on March 9, 2005 is acknowledged. Because applicant did not distinctly and specifically point out the supposed errors in the restriction requirement, the election has been treated as an election without traverse (MPEP § 818.03(a)).

Claims 1-5 and 15-20 are withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected invention, there being no allowable generic or linking claim. Election was made **without** traverse in the reply filed on March 9, 2005.

### ***Drawings***

The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the "line source in a microbeam plasma source" must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate

changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

### ***Claim Objections***

Claim 7 is objected to because of the following informalities: The claim recites "the target plane." Claim 6, the parent claim, does not recite or define such a feature. For the purposes of this Office action, the examiner has interpreted the term to mean the plane defined by the surface of the target. Appropriate correction is required.

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

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1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

Claims 6 and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mizumura et al. (USPN 5,825,035) in view of Kawanami et al. (USPN 5,065,034).

Regarding claim 6, Mizumura et al. teaches a Focused Ion Beam (FIB) system comprising a vacuum system (Fig. 29, Note surrounding vacuum chamber), a charged particle beam column (Including but not limited to Items 113, 115, 116, and 117 in Fig. 29 for example), one or more lenses (Item 115 and 115'), an aperture (Item 114), a secondary electron detector (Items 123 or 723), and a control means (717).

Mizumura et al. fails to teach an aperture having at least one straight edge for producing a shaped beam having at least one sharp edge at a target.

Kawanami et al. discloses an ion beam apparatus having an adjustable aperture where the aperture defines straight edges. Note Fig. 5, 6A, and 6B.

Modifying the aperture of Mizumura et al. to have a straight edge, rather than a round shape, constitutes a change in the shape of that which is taught in Mizumura et al. This modification would necessarily produce a beam having a different cross-sectional configuration. In combination with Kawanami et al., the adjustable aperture would produce a beam having a selectable profile and current.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to utilize the adjustable aperture of Kawanami et al. in the ion beam

milling apparatus of Mizumura et al. because the provision of the Kawanami et al. aperture changes the shape of the aperture in Mizumura et al. It has been held that making the configuration of that which is disclosed in the prior art different is an obvious modification. See *In re Dailey*, 357 F.2d 669, 149 USPQ 47 (CCPA 1966).

Regarding claim 13, Mizumura et al. further teaches a stigmator means (Item 707) for rotating the beam.

Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Mizumura et al. (USPN 5,825,035) and Kawanami et al. (USPN 5,065,034) in further view of Nixon (USPN 4,804,851).

Mizumura et al. and Kawanami et al. teach all the required limitations of claim 6 as pointed out above. Mizumura et al. further teaches the use of a plasma beam source including a plasma (8) and extraction electrode (4).

Mizumura et al. and Kawanami et al. fail to disclose the use of a line source.

Nixon teaches a charged particle source comprising a line source (Col. 4 Lines 32-68).

Modifying the charged particle source of Mizumura et al. with the device of Nixon would provide a line plasma beam source.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to utilize a line source over a point source such as that disclosed in Mizumura et al. because a line source creates a beam having a higher current density and reduces the exposure time required (See Nixon at Col. 4 Lines 53-58).

***Allowable Subject Matter***

Claims 7-9, 11-12, and 14 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter:

Regarding claims 7-9, the prior art fails to teach or suggest the under or over focusing of a charged particle beam source with respect to a target plane. Mizumura et al. mentions at Col. 20-23 the ion lens effect, which produces an expanding and defocused ion beam after passing through an aperture or a lens. However, the degree of focus of a charged particle beam is controlled in the prior art by the degree of excitation of the lens system, not the alignment of the aperture relative to the lens system. As such, claim 7 contains subject matter allowable over the prior art. Claims 8-9 are similarly objected to by virtue of their dependency.

Regarding claims 11-12, the prior art fails to teach or suggest positioning and dimensioning the aperture such that a beam current density profile is at a maximum at a beams sharp edge where the current density decreases in an opposite direction moving away from the edge in the ion beam. It is the opinion of the examiner while evaluating this claim that given the combination of Mizumura et al. and Kawanami et al. satisfies the limitations of claim 6 above, there is not a sufficient teaching to establish the current density profile of the beam in the manner recited in claim 11. Therefore, claim 11

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contains allowable subject matter. Claim 12 is objected to for containing allowable subject matter by virtue of its dependency on claim 11.

Regarding claim 14, the examiner further cites US Patent No. 6,635,891 B1 to Nakano et al. Nakano et al. clearly teaches the use of a D-shaped aperture in a charged particle lithography device. Taken with the prior art however, there is no teaching or suggestion to defocus the target away from a first order focal plane a distance  $Z_{sub.0}$  greater than or equal to the product of the spherical aberration coefficient and the square of the maximum beam angle with respect to the optical axis.

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to David A. Vanore whose telephone number is (571) 272-2483. The examiner can normally be reached on M-F 7:30-5:00.

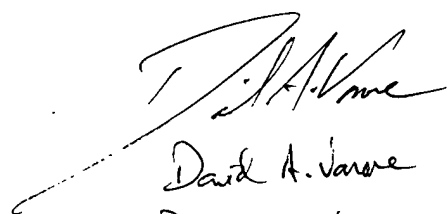
If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, John R. Lee can be reached on (571) 272-2477. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.



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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

dav



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